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Weekly Bulletin

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RURAL HOUSE SEWAGE DISPOSAL.*

By R. F. GOUDEY, Assistant Engineer, Bureau of Sanitary Engineering, Los Angeles, California.

The first step in building a house of any sort is the erection of a temporary privy for the workmen. Such privies usually give the necessary privacy but from public health considerations are often very primitive. After completion of the house some more permanent method of sewage disposal is desired, either sanitary privies, chemical toilets or water-flushed systems.

The term "sanitary privy," broadly speaking, includes all types of privies which protect public health. Eastern health officers uniformly condemn the dirt privy, principally because of unfavorable climatic conditions in their sections of the country. The greater part of California, however, with its short seasonal rainfall, moderate climate, and low ground-waters levels in general permits the use of properly constructed dirt privies which meet all sanitary requirements. In some instances the dirt privy often constitutes a less menace to public health than more complicated systems. The dirt privy should never be used in marshy or hookworm infected areas.

Recently, officials of the United States Public Health Service inspected over eighty thousand rural homes in fifteen representative counties throughout the United States. Less than two per cent of the privies were found to be sanitary and one-third of the houses were improperly screened. California can not boast of much better conditions. The federal government, in a few sections of the country, has carried on educational campaigns for sanitary privies which materially lowered typhoid fever deaths and in some cases wiped it out entirely. Although California has a comparatively low typhoid fever rate most of what it does have is traceable to poor sanitation. The health officers and sanitary inspectors through campaigns for better rural sanitation can reduce typhoid fever in California to practically nil. The rural population of California is particularly progressive and ready to cooperate. The health officers and sanitary inspectors need only to present their requirements in a businesslike and sympathetic attitude.

A dirt privy to be sanitary must meet the following specifications:

1. The location must not be on ravines, steep slopes, water-bearing areas, or within polluting distance of any potable waters.
2. It must have a deep pit, braced to prevent caving, and banked at the top to avoid flooding. When the pit is three feet from being full it must be covered and abandoned.
3. A house must be provided which will give privacy, light, and ventilation. A tight and wide seat box with a self-closing seat cover is necessary. There should be no braces directly under the seat.
4. Flies must be controlled either by thorough screening of the entire house or by using oil in a tight dark pit.
5. Odors must be controlled by providing adequate pit ventilation or by occasional scattering of ashes, chloride of lime, or loam over the excreta.

The absolute control of flies by the screening method is practically impossible. It is easy to keep all openings properly screened and covered, such as knot holes, cracks in joints, slits in sheathing, ventilators, loose closing doors, space between warped seats and their covers, and finally earth shrinkage cracks leading direct to pit. For such reasons the army in some of its camps abandoned screening methods and absolutely controlled flies by making the pits dark, providing tight seat boxes, and spraying pit daily with oil. This has led some of the sanitary inspectors and health officers to lay particular stress on making the pit and privy boxes fly-tight.

The pit should be made large enough to serve the people to be accommodated. Two cubic feet per month should be allowed for the average family. The cost of construction varies widely but should not exceed fifty dollars ($50) per family.

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*Read at Annual Conference of California Health Officers, Coronado, September 12, 1923.

CHEMICAL TOILETS.

A chemical toilet is primarily an in-door privy. When properly installed and cared for it is practically odorless and void of fly nuisance. The chief parts are a seat and a rustproof metal receptacle containing the excreta, and a caustic chemical. The container may be directly under the seat or be connected by a metal tube to a container below. Minor parts consist of ventilators, devices to mix feces with chemical, and drains for withdrawing contents to cesspools or for burial. The chemical is first dissolved in water before being placed in the container. A single chemical charge costs about two and one-half dollars ($2.50) and will serve one family about one year. Tests of three different installations in Los Angeles County show complete sterilization at times of samplings.

The chemical toilet has been commercialized by several manufacturers represented in California. One of the cheapest types can be had for ten dollars ($10), but better installations cost one hundred and ten dollars ($110) delivered at Los Angeles. These toilets can be built in batteries to serve any number of people. A battery of four seats and one urinal, which can accommodate about two hundred men, costs about three hundred and twelve dollars ($312). The yearly cost of chemical for such a battery is about twenty dollars ($20).

The chief drawback of the chemical toilet has been its mechanical defects. The manufacturers now claim to have overcome these difficulties. Nevertheless, occasionally parts of the stirring device rust off so that the feces can not be mixed with the chemical. Violent odors result. If the stirring device is not used each time the toilet is used odors will be noticed. Spotting on the sides of the seat bowl if allowed to accumulate become sources of odor as well as being unsightly. Another drawback is the fact that the chemical which must be used when the toilet is recharged is obtainable only from the manufacturer of the toilet. Such chemical might not be on hand when needed.

The advantages of the chemical toilet are manifest, namely; it is a comfortable inside toilet suited in sections of the state having severely cold climate in the winter, where water supply is not available, and in cases where water-flushed systems are impractical. It has also a legitimate use on transcontinental automobiles, launches, river boats, and along the shores of lakes and streams where pollution must be prevented. A large number of chemical toilets are giving satisfaction at the resorts around Big Bear Lake. Installations in rural schools in Los Angeles County are satisfactory. However, experience dictates that chemical toilets, where their use is proper, are successful when intelligent operation and supervision are not only available but are actually given. Moreover, users of the toilet must refrain from throwing miscellaneous objects into the toilet which will interfere with the stirring device.

WATER-FLUSHED SYSTEMS.

Privies and chemical toilets constitute "dry" methods of disposal in contrast to water-flushed toilets supplemented with cesspools, septic tanks, and subsurface drains which constitute the "wet" method of disposal.

The change from the "dry" to the "wet" method is usually made when the owner obtains a water supply and is sufficiently progressive to make the improvement. It usually means the installation of wash bowls, sinks, laundry-trays, and bath tubs in addition to the closet. Wastes from these other fixtures complicate the problem of sewage disposal.

The initial step in successful sewage disposal is first the proper selection of plumbing fixtures which will reduce the volume of wastes to a minimum and second an arrangement of plumbing fixtures which will best fit in with the adopted plan of sewage disposal. In cities the volume of waste waters averages about 65 gallons per person per day. The actual sanitary requirement is probably less than ten gallons per person per day. This difference in these two figures represents extravagance. In rural districts the volume of wastes usually is about 25 gallons per capita per day. Efforts should be made to reduce even this to a lower figure, not so much because the water supply is limited and expensive but because it simplifies the problem of disposal. Rural plumbing therefore should adopt small piping, self-closing faucets, low water pressure, and water-closets requiring but two and one-half gallons per flush instead of the usual city toilet using five gallons per flush. All waste and leakage should be avoided. Because rural homes have low roofs the various plumbing fixtures do not have to be grouped to secure a common vent system. Advantage can be taken of this where it is desirable to have two separate drainage systems, one for the toilet waste and the other for the greasy waters. At any rate the fixtures can be arranged more economically and in more convenient positions than in city plumbing. Semi-urban districts anticipating annexation or incorporation should install plumbing which will serve for all time. The cost of plumbing installations should not exceed $500 per home.

The various wastes are carried from the house to the point of disposal in sewer pipe, either made of concrete or vitrified clay. This pipe, usually four to six inches in diameter must be laid on a proper grade and have a straight alignment at least fifty feet from trees. To insure self-cleansing of the sewer a fall of nine inches per one hundred feet and seven inches per one hundred feet should be used for four and six-inch pipes respectively. Continuous ventilation should be allowed from the sewers back up through the house vents.

TREATMENT AND DISPOSAL.

In California almost without exception final disposal of house wastes must be made into the soil either through cesspools or by subsurface irrigation. Legislation prohibits the discharge of sewage onto the surface of the ground or into streams. Either procedure is facilitated by clarification in older cesspools or in septic tanks.

Cesspools

A cesspool is a covered pit of any shape, braced with wood or masonry such that the liquid portion of the waste may percolate into the surrounding soil or sub-strata. Where top soils are impervious cesspools must reach sand or gravel. These are termed "deep" cesspools, but can not be used except where there is no danger of polluting underground supplies. Where ground water is near the surface and the top soil is open elongated pits as shallow as two feet can be used. These are known as shallow cesspools. The actual depth of cesspools, in practice, vary from two to one hundred and twenty-five feet. Ordinary cesspools should have a cross-sectional area of two to six square feet per person, depending upon the porosity of the soil. They should not be located under buildings or on hill slopes. Resting of cessspools for several months at a time will prolong their life materially. Cesspools located in coarse granitic sand usually give off very bad odors unless vented by a stack up the nearest tree or by covering the vicinity of the cesspool with clay or other impervious material.

The cost of cesspools varies widely. Some sections pay only fifteen dollars, whereas in others the cost runs over one hundred dollars.

A cesspool ordinarily lasts three to five years. Near cities they can be pumped out by cesspool companies for ten dollars or more. Cesspools are expensive, even more so than the individual cost of sewer systems in cities, but their life can be increased many times by first passing the greasy wastes through grease traps and by-passing all toilet wastes through old cesspools or septic tanks.

The travel of pollution under ground from cesspools depends on a great many factors. In fine sandy soils pollution might travel but a few feet but where the material is of gravel the pollution may travel over one thousand feet. To be safe the natural purification agencies of the soil should not be overburdened and cesspools should never be located near a potable stream, lake, spring, or well, where there will be any possibility of pollution.

Septic tank

A septic tank is merely a receptacle where sewage wastes are allowed to pass through slow enough to deposit one-half to three-quarters of its suspended matter and one-third of its organic matter. The deposited solids, called sludge, undergoes decomposition. Portions of the sludge are occasionally carried to the top of the tank by entrained gases and sometimes pass out with the sewage. The sludge at the top is called "scum." Portions of it resettle. The sewage passing through the tank carries off the liquid and gaseous products of decomposition. It is therefore highly odorous and must be disposed of without contact with the air unless isolation is sufficient to prevent nuisance.

A great many septic tank builders by making extravagant and bogus claims have confused the general public and have made the septic tank a mysterious process. This has created mistaken ideas and enables the builders to charge two to three times what would be a fair price. The water from a septic tank is not sparkling clear and from a hygienic standpoint is as dangerous as raw sewage. It should not be used for irrigating fruit or raw vegetables. The new tanks do not have to be inoculated with any specific types of bacteria or manure. A roof is not essential to the action of the tank but is often desirable to control odors. If a tight roof is provided such a tank can be located anywhere. Compartments are not needed in the tank and if put in will interfere with the settling process. Septic tanks must be cleaned periodically and thereby increase the life of the remainder of the works. Septic tanks should have a capacity equivalent to one-half of the estimated daily sewage flow plus an allowance of one cubic foot per person for sludge storage. Patented tanks having liberal capacity will prove successful. Tanks are ordinarily constructed of wood or concrete. The bottom can be eliminated. If covered tightly manholes should be provided. The top of the tank must be vented back into the incoming sewer. If ground slopes permit a drain should connect the bottom of the tank with a sand bed to receive sludge and thereby avoid pumping out of tank when it is necessary to clean it.

Quite a few ranchers prefer types of tanks which can be fitted in place without depending upon plans or sketches. Large sizes of concrete or vitrified pipes have proven useful in this connection.

The cost of a good septic tank for the average family should not exceed forty dollars ($40).

Subsurface irrigation

Subsurface irrigation is the means by which partially clarified sewage is distributed through drains laid in shallow trenches and is allowed to pass out into the surrounding soil. This form of disposal is best suited in open fields having porous soil. The entire process is underground, is unseen and is odorless. Filtration through but a few feet of fine soil will render the sewage sterile and well oxidized.

In laying out such a system three units are usually provided, such that one can rest one week in three for rejuvenation. A switch box makes this possible. The total length of drains in two units which is the total in use at any one time depends on the number of people to be served and the porosity of the soil. Ordinarily twenty feet per person in coarse soils and 100 feet in tight soils is required. In tight soils gravel and cinders are placed in the bottom of the trench and around the drains. This provides storage as well as being a rough filter. The drains should not be closer than four feet and be not longer than one hundred feet in any line. The best drains are two, three, or four-inch agricultural tile. Seconds of four-inch sewer pipe can sometimes be secured cheaper. Inverted wooden troughs have proven successful. If tile or pipe are used a space of three-quarters of an inch should be allowed, between joints. The proper slope of the drains depends on the size of drain used and the porosity of the soil. The idea being to give a slope so sewage will pass out from each joint, and not from the first few joints. For impervious soils a slope of two inches per 100 feet is sufficient. In coarse soils a slope of five inches per 100 feet is used.

Subdrains are sometimes used to accelerate filtration, but this practice is not generally desirable as gopher and ground squirrel holes many times cause direct passage of sewage from the drains to the sub-drains.

In larger installations serving several families, the life of the subsurface system can be lengthened by making the flow from the septic tank intermittent. Dosing tanks constructed on the same principle as flush boxes in the ordinary water closets or tanks with automatic siphons can be used. One difficulty is the dribbling of sewage at times of low flow. The action of the dosing devices can be made positive by weir gates in the septic tank controlled by floats in the dosing tank.

The cost of subsurface drainage systems for rural homes varies from $25 to $50.

High grade treatment works

In exceptional cases neither cesspools or subsurface irrigation can be used in which case high grade treatment plants patterned after municipal installations are sometimes installed. A good description of such plants as well as septic tanks can be found on page 551 of the June issue, 1921, of the Journal of the American Public Health Association. Additional information is available in Public Health Bulletin No. 101. A pamphlet describing privies, cesspools, and septic tanks can be secured by request from the Bureau of Sanitary Engineering, 102 Civil Engineering Building, Berkeley, Cal.

SCHOOL NURSING.

One of the indispensable parts of any comprehensive public health program is that which touches the school child. While the school child is at that age when death leaves its lightest trail he is still plastic in the hands of an unnatural environment which is ever ready to leave its scarring traces. But even more important is the fact that it is pre-eminently the school child into whose life may be built the health habits, health knowledge and health ideals which alone can carry the nation to new levels of health and happiness.—Philip S. Platt.

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Births, deaths and sickness are like the temperature, pulse and respiration of a patient and disclose the state of community health.

HAVEN EMERSON, M.D.

MORBIDITY.*

Diphtheria.

190 cases of diphtheria have been reported, as follows: Los Angeles County 23, Los Angeles 47, San Francisco 25, Berkeley 6, Ukiah 1, Torrance 1, Huntington Park 1, Pittsburg 4, Yuba City 1, Pomona 1, Lompoc 5, San Diego County 3, Selma 2, Stockton 3, Porterville 1, San Joaquin County 2, Tuolumne County 1, Pasadena 2, Santa Cruz County 1, South San Francisco 1, Sacramento County 1, Sonoma County 1, Long Beach 3, Bakersfield 1, Santa Ana 3, Hanford 1, Santa Rosa 2, Alameda County 1, Daly City 2, Humboldt County 3, Sacramento 2, Santa Clara County 1, East San Diego 3, Redlands 1, Vallejo 4, Oakland 30.

Measles.

185 cases of measles have been reported, as follows: San Francisco 90, Plumas County 6, Riverside 7, Berkeley 10, Alameda 13, Monterey County 9, Pittsburg 9, Orange County 2, Los Angeles 3, Santa Rosa 1, San Luis Obispo County 3, Plumas County 1, San Mateo 2, Lompoc 4, San Joaquin County 2, Calaveras County 2, Santa Barbara County 2, Salinas 2, Long Beach 1, South San Francisco 1, San Gabriel 1, Alhambra 1, Sonoma County 3, Oakland 10.

Scarlet Fever.

115 cases of scarlet fever have been reported, as follows: Sutter County 6, San Francisco 11, Los Angeles 29, Orange County 6, Los Angeles County 10, San Joaquin County 5, Riverside 7, Watsonville 1, Bakersfield 1, Santa Rosa 1, Pasadena 1, Livermore 4, Long Beach 1, Stanislaus County 3, Mono County 3 Orange 4, San Luis Obispo County 1, Ukiah 1, Pomona 1, Monrovia 1, Manhattan Beach 1, Pittsburg 1, Stockton 2, Riverside County 1, Santa Ana 1, Hanford 1, Santa Cruz 2, Vallejo 1, Oakland 8.

Whooping Cough.

16 cases of whooping cough have been reported, as follows: Pasadena 2, Humboldt County 3, Los Angeles 2, San Francsco 5, Los Angeles County 1, Oakland 3.

Smallpox.

27 cases of smallpox have been reported, as follows: Los Angeles 14, Los Angeles County 6, San Francisco 1, Inyo County 1, Orange County 1, Redondo Beach 2, Pomona 1, Oakland 1.

Typhoid Fever.

14 cases of typhoid fever have been reported, as follows: Los Angeles 7, San Francisco 2, Riverside 1, Orange County 1, Alameda 1, Plumas County 1, Oakland 1, Barstow 1.

Poliomyelitis.

12 cases of poliomyelitis have been reported, as follows: Los Angeles 6, Berkeley 1, Los Angeles County 2, Burbank 1, Long Beach 2.

Epidemic Encephalitis.

San Bernardino County reported two cases of epidemic encephalitis.

Typhus Fever.

Los Angeles reported two cases of typhus fever.

Botulism.

Los Angeles reported one case of botulism.

Leprosy.

Sacramento reported one case of leprosy.

Epidemic Jaundice.

Los Angeles County reported two cases of epidemic jaundice.

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*From reports received on October 22d and 23d for week ending October 20th.

COMMUNICABLE DISEASE REPORTS.

Disease	1923				1922			
	Week ending			Reports for week ending Oct. 20 received by Oct. 23	Week ending			Reports for week ending Oct. 21 received by Oct. 24
	Sept. 29	Oct. 6	Oct. 13		Sept. 30	Oct. 7	Oct. 14	
Anthrax	0	0	1	0	0	0	0	0
Botulism	0	0	0	1	0	0	0	0
Cerebrospinal Meningitis	0	0	1	0	5	0	4	2
Chickenpox	30	49	39	60	27	24	38	37
Diphtheria	160	149	218	190	143	167	171	181
Dysentery (Bacillary)	0	3	3	2	1	2	2	0
Epidemic Encephalitis	2	2	2	2	1	1	2	0
Epidemic Jaundice	0	0	0	2	0	0	5	0
Gonorrhoea	108	116	96	124	103	116	115	132
Influenza	18	18	17	13	14	29	22	16
Leprosy	0	1	0	1	0	0	0	0
Malaria	6	13	8	6	8	13	7	6
Measles	228	223	242	185	6	12	13	17
Mumps	7	9	8	7	25	22	40	28
Pneumonia	54	45	35	46	38	41	51	63
Poliomyelitis	16	28	23	12	2	2	2	0
Scarlet Fever	66	63	126	115	69	97	96	111
Smallpox	14	15	20	27	5	4	6	5
Syphilis	124	91	137	95	110	116	104	112
Tuberculosis	154	168	200	133	141	135	158	126
Typhoid Fever	23	22	25	15	30	23	24	22
Typhus Fever	0	0	0	2	0	0	0	0
Whooping Cough	42	25	37	16	32	30	81	47
Totals	1052	1039	1238	1054	760	834	941	905

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